

Claims

1. A nucleic acid molecule encoding a protein from Zea mays with the biological activity of a debranching enzyme, selected from the group consisting of:
 - (a) nucleic acid molecules encoding a protein comprising the amino acid sequence depicted in SEQ ID NO: 2;
 - (b) nucleic acid molecules containing the nucleotide sequence depicted under SEQ ID NO: 1;
 - (c) nucleic acid molecules hybridizing to a nucleic acid molecule of (a) or (b); and
 - (d) nucleic acid molecules the nucleotide sequence of which deviates from the nucleotide sequence of a nucleic acid molecule of (a), (b) or (c) due to the degeneracy of the genetic code.
2. The nucleic acid molecule of claim 1, which is a cDNA molecule.
3. A nucleic acid molecule of a length of at least 15 bp, hybridizing specifically with one strand of the nucleic acid molecule of claim 1 or 2.
4. The nucleic acid molecule of claim 3, hybridizing specifically with the transcript of a nucleic acid molecule of claim 1 or 2 and thereby preventing its translation.
5. A vector containing a nucleic acid molecule of claim 1 or 2.
6. The vector of claim 5, wherein said nucleic acid molecule is linked in sense-orientation to regulatory elements, which enable the transcription and translation in prokaryotic or eukaryotic cells.
7. Host cell transformed with a nucleic acid molecule of claim 1 or 2 or with a vector of claim 5 or 6, or which is derived from such a cell.

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8. A method for producing a protein from Zea mays with the biological activity of a debranching enzyme, in which the host cells of claim 7 are cultivated under suitable conditions and the synthesized protein is recovered from the culture.

A protein from Zea mays, which has the biological activity of a debranching enzyme and is encoded by the nucleic acid molecule of claim 1 or 2.

10. A transgenic plant cell transformed with a nucleic acid molecule of claim 1 or 2 or with a vector of claim 5 or 6, wherein the nucleic acid molecule encoding the protein with the biological activity of a debranching enzyme from maize is placed under the control of regulatory elements that allow for the transcription of a translatable mRNA in plant cells.

11. A transgenic plant containing transgenic plant cells of claim 10.

12. The transgenic plant cell of claim 11, which is a starch-storing plant.

13. The transgenic plant of claim 12, which is a cereal plant.

14. The transgenic plant of claim 13, which is a maize plant.

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15. Starch obtainable from plant cells of claim 10 or from plants of any one of claims 11 to 14.

16. A transgenic plant cell in which the activity of a debranching enzyme encoded by a nucleic acid molecule of claim 1 or 2 is reduced when compared to untransformed cells due to the inhibition of transcription or translation of endogenous nucleic acid molecules encoding a debranching enzyme, the inhibition of the transcription being achieved by

(a) the expression of a nucleic acid molecule of claim 1 or 2 or of a part of such a nucleic acid molecule, wherein the nucleic acid molecule or part thereof is linked in antisense-orientation to regulatory elements ensuring the transcription in plant cells;

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- (b) the expression of a ribozyme specifically cleaving transcripts of the nucleic acid molecules of claim 1 or 2; and/or
- (c) the expression of a cosuppression RNA, leading to the inhibition of the expression of endogenous genes encoding a protein of the invention.

17. Transgenic plants containing plant cells of claim 16.
18. The transgenic plant of claim 17, which is a maize plant.
19. Starch obtainable from plant cells of claim 16 or from plants of claim 17 or 18.
20. Propagation material of plants of any one of claims 11 to 14 or of claim 17 or 18 containing plant cells of claim 10 or claim 16.

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Use of the starch of claim 15 or 19 for the production of foodstuffs or of industrial products.

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